

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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Date of Filing Complete Specification Sept. 11, 1962.  
Application Date June 12, 1962.  
Complete Specification Published Dec. 8, 1965.  
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No. 27738/62.



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## COMPLETE SPECIFICATION

### Improvements in or relating to Liquid Flow Control Valves

We, J. GORDON & SONS, Limited, a British Company, of 15/15, Market Street, Leicester, do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention is for improvements in or relating to liquid flow control valves and has for one of its objects to provide a simple and inexpensive valve arrangement which is effective in operation. A further object is to provide a simple form of valve suitable for use in a domestic appliance.

In accordance with the invention there is provided a liquid flow control valve comprising a flexible pipe and means for portions of the pipe, each means being hinged to one another about a pivotal axis extending transversely of the length of the pipe. The spaced means are so arranged that they can be moved to hinge towards one another to bend the flexible pipe so as to form a kink or fold thereby actuating the valve to interrupt completely the flow passage in the pipe. By varying the degree of relative angular displacement between the two means the flow passage can be varied to the extent of a greater or less extent so that variation between full opening and complete closure is possible.

In a preferred form of construction the valve comprises two rigid plates or strips hinged to one another and respectively supporting members for portions of the flexible pipe. Such members may be formed as rings or loops to embrace the pipe pieces or loops to embrace the pipe. The latter then passes along one plate or strip through its end, passed the hinge whereby of the axis thereof and along the other plate or strip and through the anchorage thereon. The plates or strips are arranged to be capable of hinging so that the angle subtended between them on the side of the pipe from 180° to an acute angle of about 60°.

In the latter arrangement the pipe will be fully hinged to stop all the passage through it.

In a convenient construction the hinged members for the pipe are spring operated to urge them to the closed setting and are arranged to be opened by a cam or lever to move them away from the closed setting against the action of the spring. The operation of the valve may be controlled manually by a hand lever or other manual control or it may be controlled automatically by a power operated cam or lever.

The invention is particularly applicable to a liquid control valve for a washing machine to control the supply of additive to the washing liquid. The invention accordingly includes a washing machine incorporating a valve as above described for the control of such additive. A particular application of the improved valve is to a dish washing machine and it may be employed for controlling the supply of detergent to the washing liquid or other additive to the rinsing liquid. In this case the valve is conveniently arranged to be capable of being pre-set to the required degree of opening to suit particular conditions so that just the required amount of additive will be supplied at each cycle operation. Such a machine may be equipped with two valves according to the invention respectively controlling the amount of the supply of detergent and other additive.

In applying the improved valve to a dish washing machine the pump which supplies liquid to the washing chamber conveniently has a one junction at its inlet, one arm of the junction being connected to a water supply and the other arm of the junction being connected to a supply of additive through a valve.

being connected to a supply of additive through a valve as above described.

In order that the present invention may be more readily understood reference will now be made to the accompanying drawings in which:—

Figure 1 is a side view of a valve according to the invention in open position.

Figure 2 is a similar view to that of Figure 1 with the valve in closed position, and

Figure 3 is a schematic diagrammatic elevation view in cross section of a portion of a dish washing machine.

In the drawings a pair of plate members 1 and 2 are hinged together about a hinge pin 3. The plate members 1 and 2 have rings 4 and 5 forming eyes attached to them respectively. These rings are attached to the plates conveniently by soldering or brazing and are arranged to have smooth surfaces. Located between the rings 4 and 5 is a spring 6 biasing the plates to adopt the position shown in Figure 2.

Located on the plate 1 is a screw threaded bush or boss 7 for co-operation with the screw threaded element 8.

A hollow tubular member 9 forming part of a connection between a source of fluid and a member to be supplied with fluid is passed through the eyes 4 and 5.

It will be understood that when the plate 1 is moved from a position illustrated in Figure 2 in which the tube 9 is kinked as at 10 to prevent the passage of fluid therepast to a position in which the full bore of the tube is opened the tube will pass through intermediate stages of flexion to give a control of the rate of fluid passing therethrough.

It will be appreciated that such a valve as herein described may be operated by hand but in the embodiment illustrated the screw threaded element 8 is preferably connected to a cam device (not illustrated) to operate the valve. By maintaining a constant stroke to the cam and by adjusting the element 8 within the boss 7 the extent to which the plate member 1 is pivoted relative to plate 2 is variable and thus the extent to which the tube is opened or closed may be adjusted.

When the valve is applied to a washing machine to control the supply of an additive the valve would be located between a reservoir of the additive and the liquid container or a pump supplying the liquid container.

In the embodiment described the kink is formed in the tube 9 by compressing the tube between plates 1 and 2 but it will readily be appreciated that the invention may be modified by arranging the tube on the opposite side of the plates 1 and 2 and arranging the hinge so that a kink in the tube over the hinge formed by the hinge.

Figure 3 shows in cross section elevation part of a dish washing machine having an outer casing 12 and a working chamber 13 having in wall spaced inwardly from the casing 12 and the working chamber there is mounted a reservoir 14 for additive liquid which may have a level indicated strip 15 appearing through a slot in casing 12. From the reservoir 14 there extends a supply tube 16 connected to the tubular member 9 of the control valve. The outlet from the tubular member is connected by a pipe 17 to a one junction 18 the other 19 of which runs to a pump pump indicated at 20. The other arm of the one junction is connected by a pipe 21 to a source of water supply. Alternatively the pipes 17 and 21 may each be connected directly to the pump 20, the one junction 18 being omitted. The control valve is shown diagrammatically as being operated by a lever 22 (which may be cam operated) engaging the head of the screw threaded element 8 so that as appropriate the action of its spring 6 is altered against the action of its spring 6 to allow supply through it of the additive liquid. The extent to which the valve is opened is pre-set by adjustment of the setting of the screw threaded element 8.

WHAT WE CLAIM IS:—

1. A liquid flow control valve comprising a flexible pipe and means for portions of the pipe, each means being hinged to one another about a pivotal axis extending transversely of the length of the pipe.
2. A valve according to Claim 1 wherein the pivotal axis of hinging of the means to one another is displaced out of the line of the pipe.
3. A valve according to Claim 1 or Claim 2 comprising two rigid plates or strips hinged to one another and respectively supporting the means for portions of the flexible pipe.
4. A valve according to Claim 3 wherein the means are formed as rings forming eyes through which the pipe passes, or loops to embrace the pipe.
5. A valve according to Claim 3 or Claim 4 wherein the plates or strips are mounted so as to be capable of hinging to vary the angle subtended between them on the side of the pipe from 180° to an acute angle of about 60°.
6. A valve according to any of the preceding Claims wherein the hinged members for the pipe are spring operated to urge them to the closed setting and are arranged to be opened against the spring action to move away from the closed setting.
7. A valve according to Claim 6 wherein the hinged members for the pipe are arranged for operation against the spring action by means of a cam or lever.
8. A washing machine comprising a liquid

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flow control valve as claimed in any of the preceding Claims for controlling the supply of additive to the liquid.

9. A washing machine according to Claim 8 wherein the flow is arranged to be passed to a required degree of opening to suit particular conditions.
10. A dish washing machine according to Claim 8 or Claim 9 having a pump which supplies liquid to the washing chamber provided with a one junction at its inlet, one arm of the junction being connected to a supply of water and the other arm of the junction being connected to a supply of additive through a valve.
11. A liquid flow control valve constructed substantially as hereinbefore described with reference to the accompanying drawings.
12. A washing machine embodying a liquid control valve constructed substantially as hereinbefore described with reference to the accompanying drawings.

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Leicester: See Printed by the Stationery Office by the Charles Press—1963.  
Published at the Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

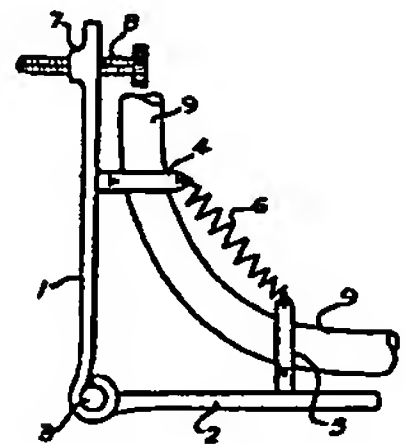


FIG. 1.

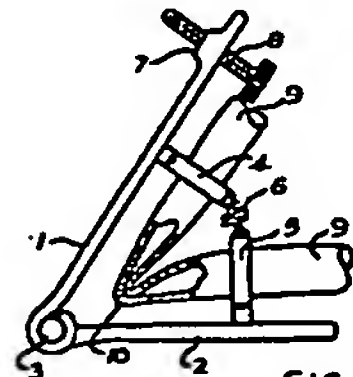


FIG. 2.

